Azdren's ArcGIS Guide

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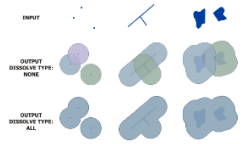
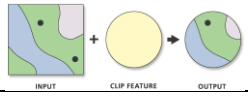
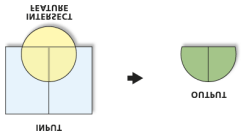
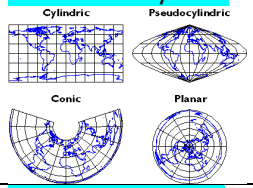
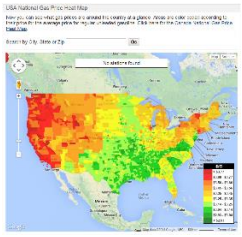
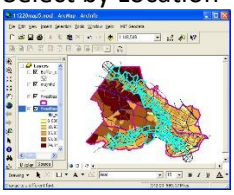
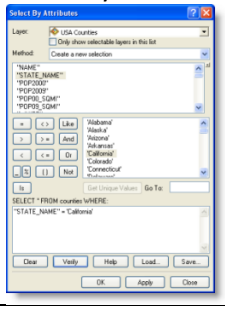
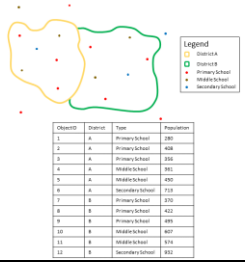
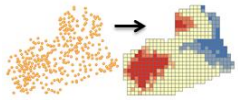
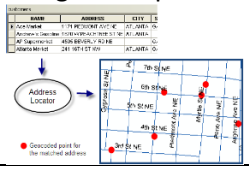
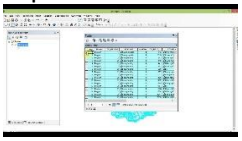
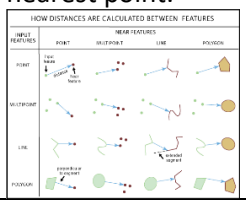
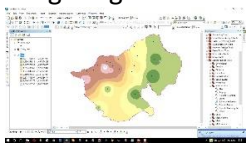
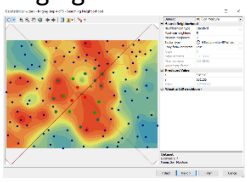
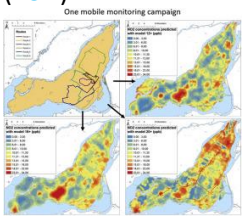
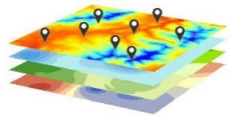
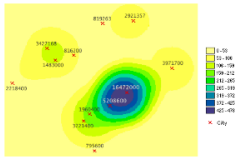
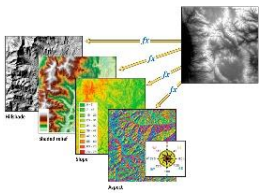
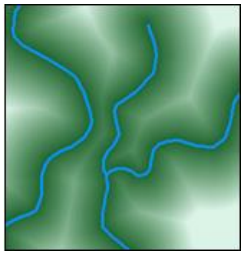
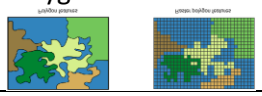
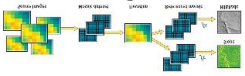
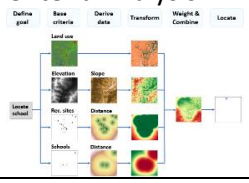
Lab #	What I can do	What it does, examples	How to do it
1	Spatial Join 	table join operation in which fields from one layer's attribute table are appended to another layer's attribute table	Analysis Toolbox > Overlay > Spatial Join
1	Create Buffer 	Creates buffer polygons to a specified distance around the Input Features.	Arc Toolbox go to Analysis Tools → Proximity → Buffer
1	Clip 	Extracts input features that overlay the clip features.	Arc toolbox → Analysis Tools → Extract → Clip. - NOTE: Input feature is bigger area; clip feature is desired boundary.
1	Intersect 	Features or portions of features which overlap in the feature classes will be written to new output Feature Class.	
1	Create spatial bookmarks	Spatial bookmarks save the current display, as zoomed in, with a name	Click Bookmarks, then click Create
1	Create a new layer of a subset of features	Sometimes just a subset of features is needed in a map layer. For example, here you will select the most populated cities in Texas and make a new layer of just these cities.	1. In the table of contents, right-click the Major U.S. Cities layer 2. Click Selection, then select Create Layer from Selected Features.
1	Save the project	Make sure that the file is easy to open again in the future.	Click the file menu and Map document properties. Make sure the Store relative pathnames to data sources is checked.
2a	Change map projection / coordinate system 	Change how the map is laid out	1. Right-click the Layers data frame in the table of contents and click Properties. 2. Click the *Coordinate System* tab and click Predefined, Projected Coordinate Systems, World, Robinson (world), and OK
	Change Projection ALTERNATE		In Arc Toolbox → 'Data Management Tools' → 'Projections and Transformations' → 'Project'.

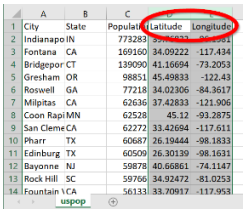
	Change Projection ALTERNATE 2	In case the above doesn't work, change the projection for the entire data frame	Go to table of contents → right click on *Layers* (this is your Data Frame). → Properties → Coordinate System → Open Projected Coordinate Systems folder → Continental → North America → select projection
2a	Symbolize area maps using size-graduated markers 	Showing variable cases on a map	1. click the Symbology tab 2. In the show panel, click quantities and Graduated Symbols 3. In the Field frame, click the value drop – down arrow, and click variable 4. Use the Template button to change the symbol type to circle with red color fill. 5. On the Symbology tab, set the symbol size range 2-12.
2a	Create a prevalence map using point markers 	Showing variable cases PER CAPITA on map	1. Open Attribute Table 2. In the Attributes of the variable, click  , Add Field. 3. Name the new field, set its Type as Double, then click OK. 4. , right-click the new field name, click Field Calculator, and click Yes. 5. In the Field Calculator, scroll down the Fields list, double-click cases variable, click the multiplication (*) button, type 10000, click the division (I) button, double-click population variable, and click OK. 6. create a map from this field.
2b	Join 	Join Table data to a shape file. Example: You can join population data to a neighborhood shape.	1. Right-click the layer you want to join the table data to. 2. click Join and Relates. 3. and then Join 4. select both variable names that are the same in each data set.
2b	Select by Location 	For example, you can select for neighborhoods with 10 or mor assaults, by using the code: "Assault1003" >3 You can use AND, OR, features in combination.	In the menu click 'Selection' → 'Select by Location'

2b	Select by Attribute 		In the menu click selection → 'Select by attribute'
2b	converting polygon shapefile into a point shapefile (centroid) 	Useful for doing things like calculating total populations within neighborhood boundaries. This is accomplished by creating centroids in each polygon while preserving the attribute table.	Open Arc Toolbox → 'Data Management Tools' → 'Features' → 'Feature To Point'.
2b	Sum point data 	Useful if you have several data point within a spatial boundary than needs to be summed.	1. Right click the spatial layer and 'Joins and Relates' and 'Join'. 2. select 'Sum'
2b	Kernel Density Hotspot analysis 	Kernel density is a great method to visualize point data. It can also be used when we don't want to show individual points data but we still want to convey clusters within the data.	1. **Open Arc toolbox → Spatial Analyst Tools → Density →Kernel Density.** 2. input file should be point data. Select output sell size.
3a	Geocode addresses using ArcMap 	Start by creating an address locator file. Need: 1. data file with addresses 2. road file	1. System Toolboxes → Geocoding Tools → Create Address Locator 2. Customize → Toolbars → Geocoding and click Geocode addresses button.
3a	Export data to Excel 	Analyze data in Excel, or other software. This creates a *.dbf* file	In the Attribute Table, select Options → Export - Make sure 'All records' is selected

3a	Calculating the distance to the nearest point. 	Calculating the distance to the nearest point. - Input features: centroid point features	In Arc Toolbox tool found at Analysis Tools → Proximity → Near
3b	inverse distance weighting 	Use measurements of a dataset with point data. Inverse Distance weighting works by assuming that data points are inversely proportional to distance.	1. Activate the Geostatistical Analyst extension (Customize → Extensions, click Geostatistical Analyst) 2. Open the Geostatistical Analyst toolbar (Customize→ Toolbars → Geostatistical Analyst)
3b	Kriging 	This calculates the relationship between how far apart points are from one another and how similar the concentrations are. Kriging works on the assumption that points in the world are related and correlate with one another.	1. Geostatistical Analyst → Geostatistical Wizard → Kriging 2. Select Data Field
3b	land use regression (LUR) 	use this equation and our rasters to calculate the average concentration at every location in your map. - First, need multiple raster maps. For example, industrial land use, 1500 buffer; highway length in 1000 m buffer; water area in 1000 m buffer; distance to city center; etc. - Second, after doing a stepwise multiple linear regression, develop formula. For example: NO_2 = 16.60 + 0.02 * ("IND_1500_10.img") + 0.30 * ("HW_1000_10.img") + 12.01 * ("MR_50_10.img") + 4.66 * ("allrd_100_10") - 0.06 * ("WTR_1000_10.img") - 0.58 * ("D_CNTR_10.img")	1. Create vector shapefiles to raster files 2. Develop regression formula 3. Open ArcToolbox go to Spatial Analyst Tools > Map Algebra > and Raster Calculator

3b	Extract Values to Points (For LUR modeling) 	This tool gives the values of a chosen raster at discrete locations on the map. For example, if you have a raster of distance to center of city, and a map of pollution points, then this tool will help determine distance to center for each point. You can do this action for each different raster map.	1. activate the Spatial Analyst Extension (under the Customize tab) 2. ArcToolbox → Spatial Analyst Tools → Extraction → Extract Values to Points
4	Creating a population raster surface from the block point file 	Creates raster from point data, to allow for data analysis. NOTE: USE THIS FOR MY FINAL PAPER – census point data. First need to calculate ???	**1. First set a few environment parameters** - Go to the Geoprocessing menu, select Environments, then Processing Extent. Change Extent to however large you want your map to be. **2. Activate spatial tools** - Click on the Customize menu, select Extensions. Check Spatial Analyst. **3. Creating new raster** - Open ArcToolbox, expand **Spatial Analyst Tools > Density > Point Density** - set input feature as point feature - population field will be the variable name - neighborhood, rectangle, 1X1, Sq km.
4	Create new Raster with different values 	If you need to do a calculation, such as figuring out population density, you can do a calculation such as: "PopDensity" / 4	**ArcToolbox > Spatial Analyst Tools > Map Algebra, → Raster Calculator**
4	Create Distance to Water raster 	Create a raster that has higher values the closer a point is to a water body. Need: water body shape file; area shape file Note: north America equidistant contic	- Make sure the projection of the water shape file is the same as the area shape file - Calculate distance to water 1. **ArcToolbox → Spatial Analyst Tools > Distance > Euclidean Distance**. 2. Set input at water shape file 3. leave output cell size to 500 - Adjust symbology to visualize surface. 1. try, Geometric Intervals for symbology - Extract distance visualization only to area. 1. Go to ArcToolbox > Spatial Analyst Tools > Extraction > open Extract by Mask. 2. set input raster to the new water distance raster

			3. Set Input raster or feature mask data to area shape file
	Polygon to Raster 	Convert polygon data to a raster map, so that you can do multi-criteria analysis	**ArcToolbox → Conversion Tools → To Raster → Polygon to Raster**
4	Normalizing different raster data sets (Modify raster data to limit values to certain degree) 	Before combining the datasets, we need to normalize the values in each raster: The values should have the same scale before we can combine them (e.g. we cannot combine elevation values that range from 0 to 4000, with degree days that range from 0 to 500, with distance values that range from 0 to 10000, so we will create a single normalized scale that goes from 0 to 1 for each raster). For example, if you have values between 0 and 300, but anything above 200 is not valuable to your research, you can use these tools:	1. **ArcToolBox > Spatial Analyst Tools > Overlay > Fuzzy Membership**. 2. Set Input raster to raster you want to modify 3. Set the Membership type to Linear 4. Enter Minimum and Maximum range values of original raster. 5. Leave Hedge set to NONE.
4	Conducting Multi Criteria Analysis 	After normalizing raster data sets, overlay them and produce the predictive map. In this example, all three maps are weighted equally.	1. **ArcToolbox > Spatial Analyst Tools > Map Algebra**, then double click on Raster Calculator. 2. Put the following expression in the windowpane: ("raster map 1" /3)+(" raster map 2"/3)+(" raster map 3"/3)
5	Georeferencing hand drawn map 		1. In the menu click customize -> toolbar and enable the georeferencing tool 2. add tracing map.png 3. In the georeferencing tool bar click 'fit to display' 4. make the .png file more transparent 5. On the georeferencing tool click the add control point button. Connect a few points. Then click update georeferencing on tool bar 6. In the menu click customize -> toolbar and enable the drawing tool. Make sure the Line tool is selected 7. Draw lines over the roads in the png file 8. In the drawing tool click Drawing button and select 'Convert Graphics to Feature'. 9. Right click the Roads Layer in the table of content and click 'Edit Features' and 'Start Editing'. Make sure the editing toolbar is shown in ArcMap (Customize→ Toolbar→ Editor)

			10. Click Editor → Editing Window → Create Feature Window to show the create feature window. In the construction window selects Line. 11. Open the Roads layer attribute table and type: 'Major Functional Seasonal'. In the editor tool bar. Save edits and click Stop Editing. 12. In the attribute table or the Roads Layer add another field of type Double and name it Length. Right click on the newly created field header and click calculate Geometry (if a window pops up, click ok). This will allow us to calculate the length of each road we created.
	get CSV data points with Lat and Long into GIS 		• Go to table of contents → right-click on the CSV file → display x y data →X field = Longitude, Y field = Latitude → click Edit → Go to the Geographic Coordinate System folder → World → WGS 1984 • Now, export the data point. Go to table of contents → right-click on the point shape file → Data → Export Data → select *the data frame* → make sure all data is in same projection